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Informationsteknologi – Programmeringsprog, deres miljøer og grænseflader for systemsoftware – Programmeringssproget COBOL

Information technology – Programming languages,
their environments and system software interfaces –
Programming language COBOL

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such copyrights or patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see <https://patents.iec.ch>).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 22, *Programming languages, their environments and system software interfaces*.

This third edition cancels and replaces the second edition (ISO/IEC 1989:2014), which has been technically revised.

The main changes are as follows:

- The following were general enhancements:
 - An asynchronous messaging facility using the SEND statement and RECEIVE statement
 - Boolean exclusive or operators
 - Boolean shifting operators
 - COBOL words may now be 63 characters long
 - The PERFORM statement has been enhanced to specify a time period for pausing the program
 - A DELETE FILE statement
 - A nonfatal EC-I-O-WARNING exception condition to handle warnings for successful input-output statements
 - EXTERNAL attributes checking between programs
 - Infinite loop for the PERFORM statement using the UNTIL EXIT phrase

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- Inline exception handling using the exception-checking format of the PERFORM statement
- An Enhanced INSPECT statement to inspect backwards
- Line Sequential file organization
- The SET statement has been enhanced to allow the setting of the length of a dynamic length elementary item
- Alternate key suppression on indexed files using the SUPPRESS WHEN phrase of the ALTERNATE RECORD KEY clause
- An optional Commit and rollback processing facility using the COMMIT statement and ROLLBACK statement
- Unsigned Packed-Decimal items defined by the NO SIGN phrase of the USAGE clause
- User-defined PICTURE clause editing using the EDITING phrase of the PICTURE clause
- VALUE clause enhancements and changes for numeric-edited items
- Type declarations may now be external items

- The following intrinsic functions were added or enhanced:
 - BASECONVERT function
 - CONCAT function
 - CONVERT function
 - EXCEPTION-FILE function and EXCEPTION-FILE-N function
 - FIND-STRING function
 - MODULE-NAME function
 - SMALLEST-ALGEBRAIC function
 - SUBSTITUTE function
 - TRIM function

- Additional compiler directives were added:
 - COBOL-WORDS directive
 - DISPLAY directive
 - FLAG-14 directive
 - POP directive
 - PUSH directive
 - REF-MOD-ZERO-LENGTH directive

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

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Introduction

COBOL began as a business programming language, but its present use has spread well beyond that to a general purpose programming language.

Any organization interested in reproducing the COBOL standard and specifications in whole or in part, using ideas from this document as the basis for an instruction manual or for any other purpose, is free to do so. However, all such organizations are requested to reproduce the following acknowledgment paragraphs in their entirety as part of the preface to any such publication (any organization using a short passage from this document, such as in a book review, is requested to mention "COBOL" in acknowledgment of the source, but need not quote the acknowledgment):

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For more details and additional changes, see E.2, Substantive changes potentially affecting existing programs and E.3, Substantive changes probably not affecting existing programs.

Further development of the COBOL language is a continuing process to provide facilities to satisfy user demand for the improved usability of the language and the adoption of relevant advances in techniques developed in the computer industry as a whole, including the desirability of interoperability with a wide variety of operating systems and other programming languages to enable developers to take advantage of their facilities, including pre-existing task solutions that then don't need to be repeated.

Annexes A, Language element lists B, Characters permitted in user-defined words, and C, Mapping of uppercase letters to lowercase letters in the COBOL character repertoire form a normative part of this document. Annexes D through G are for information only.

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Annex D, Concepts, includes an explanation of major features as well as the more complicated prior features and is the suggested starting point for the reading of this document.

A complete list of technical changes is given in Annex E, Substantive changes list.

The previous COBOL standard was published in 2014. Implementors have provided language extensions in response to the demands of their users. Several changes and extensions have, therefore, been made in this document to prevent further divergence, and to ensure consistency among, and coherence within, various implementations.

Development of the COBOL language began before the invention of formal techniques for specification of programming languages. Hence, the COBOL standard uses its own description techniques, which are described in Clause 5, Description techniques. These techniques involve general formats, which describe the syntax, and natural language.

During the development of this document, great care was taken to minimize changes that would affect existing programs. Most substantive changes that potentially affect existing programs were introduced to resolve ambiguities in the previous COBOL standard. Details of the substantive changes are given in Annex E, Substantive changes list.

In this document, the following verbal forms are used:

- 'shall' indicates a requirement;
- 'should' indicates a recommendation;
- 'can' indicates a possibility or a capability;
- 'may' indicates a permission.

Information marked as 'NOTE' is intended to assist the understanding or use of the document. 'Notes to entry' used in Clause 3 provide additional information that supplements the terminological data and can contain requirements relating to the use of a term.

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Information technology — Programming languages, their environments and system software interfaces — Programming language COBOL

1 Scope

This document specifies the syntax and semantics of COBOL. Its purpose is to promote a high degree of machine independence to permit the use of COBOL on a variety of data processing systems.

This document specifies:

- The form of a compilation group written in COBOL.
- The effect of compiling a compilation group.
- The effect of executing run units.
- The elements of the language for which a conforming implementation is required to supply a definition.
- The elements of the language for which meaning is explicitly undefined.
- The elements of the language that are dependent on the capabilities of the processor.

This document does not specify:

- The means whereby a compilation group written in COBOL is compiled into code executable by a processor.
- The time at which method, function, or program runtime modules are linked or bound to an activating statement, except that runtime binding occurs of necessity when the identification of the appropriate program or method is not known at compile time.
- The time at which parameterized classes and interfaces are expanded.
- The mechanism by which locales are defined and made available on a processor.
- The form or content of error, flagging, or warning messages.
- The form and content of listings produced during compilation, if any.
- The form of documentation produced by an implementor of products conforming to this document.
- The sharing of objects and resources other than files among run units.

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2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 60559:2020, *Information technology — Microprocessor systems — Floating-Point Arithmetic*

ISO/IEC 646, *Information technology — ISO 7-bit coded character set for information interchange*

ISO/IEC 1001:2012, *Information technology — File structure and labelling of magnetic tapes for information interchange*

ISO 8601-1:2019, *Date and time — Representations for information interchange — Part 1: Basic rules*

ISO/IEC/IEEE 9945:2009, *Information technology — Portable Operating System Interface (POSIX®) Base Specifications, Issue 7*

ISO/IEC 10646, *Information technology — Universal Coded Character Set (UCS)*

ISO/IEC 14651:2020, *Information technology — International string ordering and comparison — Method for comparing character strings and description of the common template tailorable ordering*